CLAIMS

What is claimed is:

1. A protein having an amino acid sequence comprising at least 30 contiguous amino acids of SEQ ID NO:4, wherein said protein does not have a fatty acid acylated cysteine followed by the amino acid sequence Trp Asp Lys Glu, and does not have a C-terminal homoserine lactone.

2. The protein of claim 1 having an amino acid sequence comprising at least 50 contiguous amino acids of SEQ ID NO:4.

3. A protein having an amino acid sequence comprising at least amino acids 1-30 of SEQ ID NO:4.

4. The protein of claim 3 having an amino acid sequence comprising SEQ ID NO:4.

5. The protein of claim 1 which is an isolated protein.

6. The protein of claim 1 which is a fusion protein.

7. The protein of claim 6, in which the fusion protein is a thioredoxin fusion protein.

8. A composition comprising the protein of claim 1 and a pharmaceutically acceptable carrier.

9. The composition of claim 8, further comprising an adjuvant.

10. The composition of claim 8, further comprising at least one polypeptide selected from the group consisting of *Mycoplasma hyopneumoniae* P46, P65, P97 and P102.

11. An immunogenic protein having an amino acid sequence as depicted in SEQ ID NO:2, or a fragment, variant or derivative thereof, wherein the immunogenic protein does not have a fatty acid acylated cysteine followed by the amino acid sequence Trp Asp Lys Glu, and does not have a C-terminal homoserine lactone.

12. An immunogenic protein having an amino acid sequence as depicted in SEQ ID NO:4, or a fragment, variant or derivative thereof, wherein the immunogenic protein

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does not have a fatty acid acylated cysteine followed by the amino acid sequence Trp Asp Lys Glu, and does not have a C-terminal homoserine lactone.

13. A method of treating or preventing a disease or disorder in an animal caused by infection with *Mycoplasma hyopneumoniae* comprising administering to the animal a vaccine formulation comprising (i) a protein having an amino acid sequence comprising at least 30 contiguous amino acids of SEQ ID NO:4, wherein said protein does not have a fatty acid acylated cysteine followed by the amino acid sequence Trp Asp Lys Glu, and (ii) a pharmaceutically acceptable carrier, in an amount sufficient to elicit an increase in *Mycoplasma hyopneumoniae* specific cellular or humoral responses.

14. The method of claim 13, wherein said protein has an amino acid sequence comprising at least 50 contiguous amino acids of SEQ ID NO:4.

15. A method of treating or preventing a disease or disorder in an animal caused by infection with *Mycoplasma hyopneumoniae* comprising administering to the animal a vaccine formulation comprising (i) an antigenic or immunogenic protein having an amino acid sequence comprising at least amino acids 1-30 of SEQ ID NO:4, and (ii) a pharmaceutically acceptable carrier, in an amount sufficient to elicit an increase in *Mycoplasma hyopneumoniae* specific cellular or humoral responses.

16. The method of claim 15, wherein said protein has an amino acid sequence comprising SEQ ID NO:4.

17. The method of claim 13, wherein said animal is a pig.

18. An isolated or purified DNA encoding in the mycoplasmal genetic code a protein having an amino acid sequence comprising at least 30 contiguous amino acids of SEQ ID NO:2, or its complement.

19. The DNA of claim 18, wherein the protein has a sequence comprising at least 50 contiguous amino acids of SEQ ID NO:2.

20. The DNA of claim 18, wherein the DNA has a sequence comprising at least 90 contiguous nucleotides of SEQ ID NO:1.

21. A DNA encoding in the universal genetic code a protein having an amino acid sequence comprising at least 30 contiguous amino acids of SEQ ID NO:4, or its complement.

22. The DNA of claim 21, wherein the protein has a sequence comprising at least 50 contiguous amino acids of SEQ ID NO:4.

23. The DNA of claim 21, wherein the DNA has a sequence comprising at least 90 contiguous nucleotides of SEQ ID NO:3.

24. The DNA of claim 22 operably linked to a heterologous promoter.

25. The DNA of claim 24 which further comprises an origin of replication active in a prokaryotic cell.

26. The DNA of claim 24 which further comprises an origin of replication active in a eukaryotic cell.

27. A host cell comprising the isolated DNA of claim 24.

28. The host cell of claim 27, wherein said cell is *E. coli* BL21 and said DNA is the expression vector pBAD/Thio-TOPO.

29. A method for the production of apo-Mhp3 or a fragment thereof, said method comprising (i) growing the cells of claim 27 under conditions wherein apo-Mhp3 is expressed, and (ii) recovering said protein.

30. The method of claim 29, wherein said protein is recovered in a soluble form.

31. The method of claim 29, wherein said protein is recovered in an insoluble form.

32. A method of treating or preventing a disease or disorder in an animal caused by infection with *Mycoplasma hyopneumoniae* comprising administering to the animal a vaccine formulation comprising (i) the DNA of claim 20, and (ii) a pharmaceutically acceptable carrier, in an amount sufficient to elicit an increase in *Mycoplasma hyopneumoniae* specific cellular or humoral responses.

33. The method of claim 32 wherein said animal is a pig.

34. An isolated DNA comprising a fragment of 15-40 nucleotides, which fragment hybridizes under stringent conditions for PCR to a DNA encoding in the mycoplasmal genetic code a protein having a sequence of at least 5 contiguous amino acids of SEQ ID NO:2, or its complement.

35. The isolated DNA of claim 34, wherein the hybridization is specific to *M. hyopneumoniae*.

36. An isolated DNA comprising a fragment of at least 90 nucleotides, which fragment hybridizes under conditions of high stringency for filter hybridization to a DNA encoding in the mycoplasmal genetic code a protein having a sequence of at least 30 contiguous amino acids of SEQ ID NO:2, or its complement.

37. A kit comprising in at least one container a first isolated DNA comprising a fragment of at least 15 nucleotides, which fragment hybridizes under stringent conditions for PCR to a DNA encoding in the mycoplasmal genetic code a protein having a sequence of at least 5 contiguous amino acids of SEQ ID NO:2, and a second isolated DNA comprising a fragment of at least 15 nucleotides, which fragment hybridizes under stringent conditions for PCR to a DNA complementary to a DNA encoding in the mycoplasmal genetic code a protein having a sequence of at least 5 contiguous amino acids of SEQ ID NO:2, wherein said kit comprises a statement indicating that the kit is useful for diagnosis of *M. hyopneumoniae* infection.

38. The kit of claim 37, wherein the hybridization is specific to *M. hyopneumoniae*.

39. A kit comprising in at least one container the isolated DNA of claim 34, wherein the hybridization is specific to *M. hyopneumoniae* and wherein said kit comprises a statement indicating that the kit is useful for diagnosis of *M. hyopneumoniae* infection.

40. A kit comprising in at least one container a protein having an amino acid sequence comprising at least 30 contiguous amino acids of SEQ ID NO:4 and a statement indicating that the kit is useful for diagnosis of *M. hyopneumoniae* infection.

41. The kit of claim 40, further comprising an anti-pig secondary antibody.

42. The kit of claim 41, in which the secondary antibody is conjugated to an enzyme that catalyzes a colorimetric reaction.

43. The kit of claim 42, wherein the enzyme is selected from the group consisting of alkaline phosphatase and horseradish peroxidase.

44. The kit of claim 42, further comprising reagents for a colorometric assay.